

Appl. No. : 10/090,083  
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### AMENDMENTS TO THE CLAIMS

1. (Previously Presented) A method of testing wire-bond connections between a bonding wire and a separate surface, the connections being produced by a bonding head with a bonding tool and a wire clamp associated with the bonding tool under pressure and the action of at least one of ultrasound and heat under initial bonding parameters, the method comprising:

lifting at least one of the bonding head and the bonding tool a first distance away from the bonding site after the bonded connection has been created;

fixedly gripping the bonding wire with the wire clamp; and

raising the bonding head or the wire clamp with bonding wire gripped therein for a second distance during which process the tensile force acting on the bonding wire is measured; and

converting results of the tensile force measurement as appropriate into changes of the bonding parameters.

2. (Previously Presented) The method of Claim 1, wherein raising the bonding head or the wire clamp for the second distance is calculated, in dependence on the structural features, so that a predetermined tensile force is exerted as a result of the raising, and an intact state of the bonded connection is detected during raising.

3. (Previously Presented) The method of Claim 2, wherein the intactness of the bonded connection is determined by observing the time course of the measured tensile force acting on the wire clamp during the raising.

4. (Previously Presented) A wire bonder comprising an integrated bonding head and a testing arrangement for testing wire-bond connections formed between a bonding wire and a separate surface by the bonding head and wherein the bonding head comprises:

a tool holder to hold a bonding tool;

a wire-clamp holder to hold a wire clamp for gripping the bonding wire;

a drive mechanism for vertical displacement of at least one of the bonding head and the tool holder and the wire-clamp holder;

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a program control system to control a predetermined movement sequence of at least one of the bonding head and the tool holder and the wire-clamp holder associated with the drive mechanism in order to carry out a measurement of tensile force at the bonding wire;

a force measuring device associated with the wire-clamp holder in order to measure a tensile force acting on a bonded connection to the bonding wire that has been produced; and

a bonding-parameter control unit that converts the tensile force measurements as appropriate into changes in bonding parameters of the wire border.

5. (Canceled)

6. (Previously Presented) The wire bonder of Claim 4, wherein the wire-clamp holder is mounted on the bonding head so that it can be elastically deflected against the action of a pretensioning element and a force-measurement element is associated with the holder.

7. (Previously Presented) The wire bonder of Claim 6, wherein the wire-clamp holder comprises a weakened preferential bending section, which ensures the elastic deflectability and adjacent which the force-measurement element is located.

8. (Previously Presented) The wire bonder of Claim 4, wherein the program control system induces the bonding head to lift a first distance and induces the wire clamp to grip the bonding wire and then induces the bonding head or the wire clamp to raise a second distance while the force measuring device measures the tensile force acting on the bonding wire.

9. (Previously Presented) The wire bonder of Claim 4, wherein the separate surface is a bonding pad.

10. (Previously Presented) The wire bonder of Claim 4, wherein the wire-clamp holder is mounted on the bonding head so that it can be linearly displaced.

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11. (Previously Presented) The wire bonder of Claim 6, wherein the force-measurement element comprises a strain gauge.

12. (Previously Presented) A method of testing wire-bonded connections between a bonding wire and a separate surface having a bonding site, the method comprising:

    lifting a bonding tool a first distance away from the bonding site after the bonded connection has been created;

    fixedly gripping the bonding wire with a wire clamp;

    raising the bonding tool for a second distance during which process the tensile force acting on the bonding wire is measured by the bonding tool; and

    converting the measured tensile force into appropriate changes in bonding parameters.

13. (Previously Presented) The method of Claim 12, wherein the method further comprises producing the wire connections with a bonding head, a bonding tool, and a wire clamp associated with the bonding tool.

14. (Previously Presented) The method of Claim 13, wherein producing the wire-bond connections includes producing the wire connections under at least one of pressure, ultrasound, and heat.

15. (Previously Presented) The method of Claim 12, wherein lifting a bonding tool comprises lifting a bonding head.

16. (Previously Presented) The method of Claim 12, wherein raising the bonding tool comprises raising the wire clamp with bonding wire gripped therein.

17. (Canceled)

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18. (Previously Presented) The method of Claim 12, wherein raising the bonding tool for the second distance is calculated in a manner so as to be dependent on the structural features so that a predetermined tensile force is exerted as a result of the raising.

19. (Previously Presented) The method of Claim 18, wherein an intact state of the bonded connection is detected during raising.

20. (Previously Presented) The method of Claim 19, wherein the intactness of the bonded connection is determined by observing the time course of the tensile force acting on the wire clamp during the raising.

21. (Previously Presented) A wire bonder device comprising a bonding head with an integrated testing arrangement for wire-bond connections between a bonding wire and a surface wherein the bonding head comprises:

- a holding tool to hold a bonding tool;
- a wire-clamp holder to hold a wire clamp for gripping a bonding wire;
- a drive mechanism for the vertical displacement of the bonding head and wire-clamp holder;
- a program control system to control a predetermined movement sequence of the bonding head and wire clamp holder wherein the program control system is associated with the drive mechanism and carries out a measurement of tensile force at the bonding wire;
- a force measuring device associated with the wire-clamp holder in order to measure a tensile force acting on a bonded connection to the bonding wire that has been produced; and
- a bonding-parameter control unit that can convert the tensile force measurements into appropriate changes in bonding parameters.

22. (Canceled)

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23. (Previously Presented) The device of Claim 21, wherein the holding tool comprises a transducer holder.

24. (Canceled)

25. (Canceled)

26. (Canceled)

27. (Previously Presented) The device of Claim 21, wherein the wire-clamp holder is mounted on the bonding head so that it can be elastically deflected against the action of a pretensioning element, and a force-measurement element associated with the holder.

28. (Previously Presented) The device of Claim 27, wherein the wire-clamp holder comprises a weakened preferential bending section or leaf-spring section, which ensures the elastic deflectability and adjacent which the force-measurement element is located.

29. (Previously Presented) The device of Claim 21, wherein the surface includes a separate surface.

30. (Previously Presented) The device of Claim 29, wherein the separate surface includes a bonding pad.

31. (Previously Presented) The method of Claim 1, wherein the force sensor comprises a strain gauge arranged to measure bending deformation of the wire clamp.

32. (Previously Presented) The wire bonder of Claim 7, wherein the preferential bending section comprises a leaf spring section of the wire-clamp holder.

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33. (Previously Presented) The device of Claim 27, wherein the force-measurement element comprises a strain gauge.